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**A DOSE INDICATOR FOR A FLUID DISPENSER DEVICE**

The present invention relates to a dose indicator, and to a fluid dispenser device including such an indicator.

5 In the field of fluid dispenser devices for dispensing several doses, and in particular in the field of sprays, numerous systems have been developed for indicating the number of doses dispensed or the number of doses still to be dispensed.

10 Most of those systems present numerous drawbacks. Thus, they are generally based on a plurality of toothed wheels forming gears, with the number of wheels depending on the quantity of doses to be counted. Consequently, the counters or indicators can become very complex, 15 bulky, and therefore costly to manufacture and to assemble. In addition, numerals are generally used as indicators, and are often difficult for the user to read, in particular when the dispenser devices are designed to dispense a large number of doses, e.g. up to 200 doses. 20 Furthermore, all current dose counter or indicator systems are unsuitable for use by the visually impaired, and in particular by the blind. Another major drawback resides in the fact that existing counters generally need an assembly procedure for assembling the dispenser device 25 that is modified by the presence of the counter, and that therefore differs from the normal assembly procedure. This increases the complexity of the device, and consequently implies a higher cost.

30 An object of the present invention is to provide a dose indicator that is intended for a fluid dispenser device, and that does not have the above-mentioned drawbacks.

35 In particular, an object of the present invention is to provide a dose indicator which is simple and inexpensive to manufacture and to assemble, and which can, in particular, be applied to all existing fluid

dispenser devices without implying a modification to the assembly procedure.

5 Another object of the present invention is to provide a dose indicator which is small, regardless of the number of doses contained in the dispenser device.

10 Another object of the present invention is to provide a dose indicator which forms a complete and separate unit, and which includes, in particular, the actuator means for actuating the indicator.

15 Another object of the present invention is to provide a dose indicator which can be read easily by the user, and which can also be used by the visually impaired, and in particular by the blind.

20 Another object of the present invention is to provide a dose indicator which avoids any risk of undercounting (failing to count a dose that has been dispensed). More particularly, an object of the present invention is to provide a dose indicator which counts during the first part of the actuation stroke of the dispenser device to which it is associated.

25 The present invention therefore provides a dose indicator for a fluid dispenser device, said indicator being characterized in that it comprises a rotary counting wheel that is displaceable in rotation, and a slide member that is displaceable in translation, said counting wheel including indicator means, indicating the number of doses dispensed or the number of doses still to be dispensed, and co-operating with a display opening provided in said slide member, said rotary counting wheel 30 including a hollow profile co-operating with a projection of said slide member, the shape of said hollow profile being such that at least some rotations of said rotary counting wheel cause said slide member to be displaced in translation, thereby modifying the position of said slide 35 member relative to said counting wheel.

Advantageously, said indicator means follow said hollow profile at least in part.

Advantageously, the shape of said hollow profile is irregular so that dose indication is progressive.

Advantageously, said hollow profile is spiral-shaped at least in part.

5       Advantageously, said rotary counting wheel and said slide member are disposed in a cover including a display window co-operating with the display opening of the slide member.

10      Advantageously, said rotary counting wheel is a thin disk including a set of teeth, said set of teeth co-operating with actuator means which are designed to cause said rotary disk to turn.

15      Advantageously, said actuator means include a drive element secured to a ring surrounding said set of teeth, said drive element coming to co-operate with said set of teeth each time a dose is dispensed.

20      Advantageously, said ring includes anti-return means preventing said rotary disk from turning in the direction opposite to the direction in which it is turned by said drive element.

Advantageously, said actuator means include at least one flexible tab.

25      Advantageously, said actuator means include a transmission element which is designed to co-operate with said fluid dispenser device each time said device is actuated, said transmission element also co-operating with said drive element so as to cause said rotary disk to turn.

30      Advantageously, said transmission element is a shoulder secured to said drive element, and co-operating with a portion of the fluid dispenser device which moves during actuation.

35      Advantageously, the rotary counting wheel, the slide member, the actuator means, and the cover form a unit which can be assembled in a fluid dispenser device.

Advantageously, the actuator means include a flexible tab comprising a first flexible-tab portion and

a second flexible-tab portion that is more rigid than the first tab portion, the first tab portion supporting an actuator pin which is designed to co-operate with the set of teeth of said rotary counting wheel each time the 5 device is actuated.

Advantageously, said ring includes an abutment which is designed to co-operate with a blocking element secured to said flexible tab so as to limit the rotation of said rotary counting wheel.

10 Advantageously, the more rigid, second tab portion is designed to flex as soon as the blocking element is blocked by the abutment means of the ring.

15 Advantageously, the rotary counting wheel is rotated by the first part of the actuation stroke of the fluid dispenser device, the flexion of the more rigid, second tab portion enabling said actuation stroke of the fluid dispenser device to be continued, despite the blocking element being blocked by the abutment means.

20 Advantageously, said indicator means are numbers and/or symbols and/or colors.

25 The present invention also provides a fluid dispenser device, comprising a fluid reservoir and a dispenser member, such as a pump or a valve, mounted on said reservoir, and further comprising a dose indicator as defined above.

Advantageously, the dose indicator is actuated by a portion of the reservoir which is displaced while the device is being actuated, and which co-operates with a transmission element of said indicator.

30 Other characteristics and advantages of the present invention appear more clearly from the following detailed description of a particular embodiment thereof, given by way of non-limiting example, and with reference to the accompanying drawings, and in which:

35 - Figure 1 is a partially cut-away diagrammatic side view of a fluid dispenser device including a dose

indicator constituting an advantageous embodiment of the present invention;

- Figure 2 is a front view similar to the Figure 1 view;

5 - Figure 3 is an exploded view of a dose indicator constituting an advantageous embodiment of the invention;

- Figure 4 is a view similar to the Figure 3 view, seen from a different angle;

10 - Figure 5 is a diagrammatic rear view of the indicator in Figures 3 and 4.

- Figure 6 is a diagrammatic front view of the indicator in Figures 3 and 4.

- Figure 7 is a partially cut-away diagrammatic view, showing the counter with 10 doses remaining.

15 - Figure 8 is a view similar to the Figure 7 view, showing the counter with no doses remaining.

- Figure 9 is a diagrammatic view of the counting wheel in Figures 3 to 8; and

20 - Figure 10 is a diagrammatic view of a counting wheel constituting a variant embodiment of the invention.

The dose indicator A of the present invention applies to any type of fluid dispenser device. However, it applies more particularly to a spray, and advantageously to an aerosol, including a metering valve mounted on a receptacle containing a fluid for dispensing and a propellant gas.

Figures 1 and 2 diagrammatically show a dispenser device B to which the dose indicator A of the present invention is particularly adapted. The device comprises 30 a body 50 and a reservoir 51 on which a metering valve 52 is assembled. The device B being actuated by axial displacement of the reservoir 51 inside the body 50, said displacement causing the rod of the valve 52 to be compressed, thereby causing a dose of substance to be 35 expelled through the mouthpiece 55. Naturally, the present invention also applies to other types of dispenser device, and in particular to spray devices of

the nasal type, or to devices including a pump instead of the valve.

Figures 3 to 10 show a dose indicator A, which can, in particular, be used with a fluid dispenser device B as described above. The dose indicator comprises a rotary counting wheel 10, preferably made in the form of a rotary disk, and designed to rotate about an axis of rotation that is substantially perpendicular to said disk 10. The rotary disk 10 is preferably thin, and is provided with a hollow profile 18 which can advantageously be formed by means of a rib.

Advantageously, the disk 10 further comprises a set of teeth 19, preferably provided on its periphery, said set of teeth 19 being designed to co-operate with actuator means which are designed to cause said disk 10 to turn, and which are described in greater detail below. The disk or counting wheel 10 also comprises indicator means 15, which can be numbers and/or symbols and/or colors, and which are designed to indicate the number of doses dispensed or the number of doses still to be dispensed. The indicator means 15 advantageously follow said hollow profile 18 at least in part. Any combination of different indicator means 15 can also be envisaged.

The indicator A shown in the figures further comprises a slide member 20 which is designed to be displaced in translation. The slide member 20 includes a projection 28, or any other equivalent means, which co-operates with said hollow profile 18 of the rotary disk 10. The slide member 20 is preferably made in the form of a thin plate, and includes a display opening 25 which is designed to co-operate with the indicator means 15 of the rotary disk 10.

Depending on the shape of the hollow profile 18, a rotation of the counting wheel 10 can cause the slide member 20 to be displaced in translation. The profile 18 is advantageously made so that indication is progressive and irregular. For example, the indicator in Figures 3

to 9 can count approximately 200 doses, with the last 50 being displayed by intervals of 5 in the display opening 25 of the slide member 20. In this embodiment, the hollow profile 18 is initially spiral-shaped, at the 5 center of the disk 10, so that each rotation of said disk 10 causes said slide member 20 to be displaced in translation. When there are only 50 doses still to be dispensed, the profile 18 becomes cylindrical, so that subsequent rotations of the disk 10 no longer displace 10 the slide member 20. The indicator numbers 15 are then displayed in the display opening 25 as the device is actuated. After the last dose, a specific symbol 17 can indicate that there are no doses left to be dispensed. Figure 10 shows a variant embodiment in which the 15 indicator can count 120 doses, with progressive indication taking place by intervals of 10 between the first and the 60<sup>th</sup> dose, and by intervals of 5 thereafter. Other progressions can also be envisaged.

The counting wheel 10 and the slide member 20 are 20 advantageously disposed in a cover 40 which is preferably also thin in structure, and which includes a display window 45 that co-operates with the display opening 25 of the slide member 20 so as to enable the user to see the indicator means 15 of the counting wheel 10.

25 The indicator A, and in particular the rotary counting wheel 10, can advantageously be actuated by actuator means integrated in said indicator A. Thus, with reference to Figures 3 to 10, the actuator means can advantageously include a drive element 31 secured to a 30 ring 30 which surrounds said set of teeth 19 of the rotary disk 10. The drive element 31 is designed to co-operate with said set of teeth 19 each time a dose is dispensed, and preferably by means of an actuator pin 35. Anti-return means 36, 37 are advantageously provided so 35 as to prevent said rotary disk 10 from turning in the direction opposite to the direction in which it is turned by the drive element 31 during actuation. The anti-

return means can comprise a flexible tab 36 that supports an anti-return pin 37 that co-operates with the set of teeth 19.

The actuator means also advantageously include a 5 transmission element 34 which is designed to co-operate with the fluid dispenser device B on each actuation, said transmission element 34 also co-operating with said drive element 31 so as to cause said rotary disk 10 to turn. In particular, and as shown in particular in Figure 1, 10 said transmission element 34 is a shoulder that is secured to the drive element 31, and that co-operates with a portion 54 of the fluid dispenser device B which moves during actuation. In the embodiment shown, said portion 54 is the fixing ring for fixing the metering 15 valve 52 onto the reservoir 51. Naturally, and more generally, any portion which is displaced while the device B is being actuated, is suitable for co-operating with the shoulder 34 so as to actuate the dose indicator A.

20 With reference to Figures 3 to 5, the actuator means can include at least one flexible tab 31 forming the drive element, said flexible tab 31 can be provided with two flexible portions 32 and 33 of different flexibilities, the portion 32 being more flexible than 25 the portion 33. For example, the portion 33 is wider than the portion 32. The flexible tab 31 supports said shoulder 34, and when the spray device B is actuated, the fixing ring 54 of the reservoir initially causes the more flexible portion 32 of the arm 31 to flex parallel to the 30 rotary disk 10, thereby causing said disk 10 to turn by drive from the actuator pin 35 which co-operates with the set of teeth 19. The flexible tab 31 advantageously includes a blocking element 38 which is designed to co-operate with a projecting abutment 39 secured to the ring 35 30. The radial distance between the blocking element 38 and the abutment 39 advantageously corresponds to a tooth of the set of teeth 19. Thus, during actuation, the

shoulder 34 is displaced (downwards in the figures) by the dispenser device B, and the more flexible arm portion 32 flexes (also downwards in the figures) until the blocking element 38 comes into contact with the abutment 5 39. This causes the counting wheel 10 to rotate over the equivalent of a tooth. The more flexible arm portion 32 is thus blocked, and it is possible for the actuation stroke of the dispenser device B to continue by means of the less flexible arm portion 33 flexing. In this way, 10 the dose indicator can be actuated in the first portion of said actuation stroke. This eliminates any risk of a dose that has been dispensed (partially or completely) not being counted, in the event of the dispenser device B being partially actuated, while enabling the actuation 15 stroke to continue after counting. The abutment 39 and the anti-return means 36, 37 ensure that each dose is only counted once.

The cover 40 advantageously includes guide means 41, such as rails or ribs, which co-operate with the slide 20 member 20 so as to guide it in its displacement in translation.

The number of teeth on the set of teeth 19 and the shape of the hollow profile 18 of the counting wheel 10 therefore give the characteristics of the dose indicator, 25 and in particular, the number of doses that the indicator can count. Thus, in the embodiment shown in Figures 3 to 9, a dose indicator is shown which is designed to count approximately 200 doses, with the last 50 being displayed numerically by intervals of 5 in the display opening 25 of the slide member. Naturally, the maximum number of doses and the display method can be varied as required by modifying the structure of the profile 18, the indicator means, or the number of teeth in the set of teeth 19. 30 The present invention therefore makes it possible to produce dose indicators which are designed to count any number of doses without modifying the shape or the size of said indicator. As mentioned above, the dimensional 35

structure of the present indicator is particularly small, in particular in terms of thickness, and the indicator A can therefore be integrated very easily into existing fluid dispenser devices B, as shown in Figures 1 and 2.

5        The dose indicator of the present invention makes it possible, in simple, inexpensive, and progressive manner, to display the number of doses dispensed or the number of doses still to be dispensed from the device. The structure of the indicator is very thin, regardless of  
10      the number of doses that it needs to indicate, and it does not include any projecting portion that implies modifications need to be made to the device to which it is applied. As shown in Figure 1, the dose indicator A of the present invention is applied very easily to any  
15      existing device, without said devices needing to be modified. The presence of the indicator A also does not require the assembly process for assembling the device B to be modified. By way of example, the indicator can be put in place in the device B via an opening provided for  
20      this purpose on the front portion of the body 50 of the device. Another advantage of the indicator of the present invention is that the actuator means of the indicator are integrated therein, so that the indicator forms an autonomous and separate unit which can be pre-  
25      assembled and can easily be integrated into any fluid dispenser device.

30      Naturally, the present invention is described above with reference to a particular embodiment thereof shown in the drawings, but it is not in any way limited to that particular embodiment. On the contrary, any modifications could be applied thereto by a person skilled in the art, without going beyond the ambit of the present invention as defined by the accompanying claims.